



Dart Aerospace Ltd.
1270 Aberdeen St
Hawkesbury, ON
K6A 1K7
Canada

Tel (613) 632-5200
Fax 613 632-5246

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D407-667-105TRN
Job Sheet 188788



Part No: D407-667-105TRN

Job Qty: 1 ea

Part Name: Crosstube Turning Detail



Part Weight: 0 lbs

Status: New

Priority: Medium

Job Created: 1/15/19

Job Tracking No:

Due Date: 2/1/19

Created By: Jesse White

Type: SOLD

Description:

Note: DWG D407-667-145 REV.D IPP Rev:a 08.02.28 new issue EC IPP Rev B 08.04.02 Removed polish EC verified by: DD

Ship Via:

Bill of Materials

Job Routing

Op No	Operation	Qty	Start Date	Due Date	Standard		Workcenter/Supplier		Sign-off
					Setup Hrs	Run Hrs	Workcenter / Supplier	Lead Time	
90	Start up Operation	1 Ea	2/1/19	2/1/19	0.00	0.00	Start Up Crosstubes-2		MD 2019-01-23
100	Mori Seiki	1 pcs	2/1/19	2/1/19	2.21	1.25	Mori Seiki TL-40		MD 2019-01-23
110	QC	1 pcs	2/1/19	2/1/19	0.00	0.00	QC2-2		MD 2019-01-23
120	Mori Seiki	1 pcs	2/1/19	2/1/19	0.00	1.12	Mori Seiki TL-40		MD 2019-01-29
130	QC	1 pcs	2/1/19	2/1/19	0.00	0.00	QC2-2		DAS 2019-01-29
140	QC	1 pcs	2/1/19	2/1/19	0.00	0.00	QC8		67 19-02-05
145	Crosstubes	1 pcs	2/1/19	2/1/19	0.00	0.36	Crosstubes-2		9-89 2019-02-05
150	HandFXtube	1 pcs	2/1/19	2/1/19	0.00	0.40	Crosstubes-3		DR 19/02/15
160	QC	1 pcs	2/1/19	2/1/19	0.00	0.00	QC7-3		21
170	Packaging	1 pcs	2/1/19	2/1/19	0.00	0.00	Packaging3-2		3-88 MAR 11 2019
180	QC21-SA	1 Ea	2/1/19	2/1/19	0.00	0.00	QC21		31 MAR 11 2019

Part Op 100 - 1- Fill tube with sand & install plugs 407-105 on both ends as per Folio FA249 2- Turn both side of tube 3- Turn first Descriptions: taper section on both side as per folio FA249

120 - 1- Turn second taper on both side 4- Scribe part # and batch # using vibrating stylus on the cuff as per Dwg D407-667-145 5- Ultra sound the crosstube as per FAI. "wall thickness mesurment" at given location.

145 - GRIND ONLY TRANSITION LINES SMOOTH LONGITUDE WAY.

150 - 1- handfinish X-TUBE INSIDE AND OUT

170 - LOCATION : LG014

Job BOM

Part / Item	Component Name	Quantity	Operation	Container
D6010-115	Crosstube Material	1 Ea (1 ea)	90-Start up Operation	B123975

Job Allocations

Operation	Component Part	Required	Inventory	Allocated
90-Start up Operation	D6010-115	1	120	0

Part Specifications

Specifications could not be found.

Entered: _____ Date: _____



WORK ORDER NON-CONFORMANCE / ROUTE UPDATE

NCR No. _____

Route update only ☐

Job: _____ Part No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐		DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Eng. (Non-AW) ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Engineering ☐ Water Jet ☐ Supplier ☐ Quality ☐			
Date : _____		Sequence #: _____		QTY Affected : _____		MRB (QSI042)	
Description Work Order Deviation				Disposition			
				Completed By			
				Lead hand / Supervisor			
				QC / QA Coordinator			
				FAULT CATEGORY			
				☐ Power Loss/Surge			
				☐ Folio/Program			
				☐ Grain Direction			
				☐ Weld			
				☐ Wrong Stock Pulled			
				☐ Out of Sequence			
				☐ Off-set/Set-up			
				☐ Positioned Wrong			
				☐ Outside Tolerance			
				☐ Drawing			
				☐ Finish			
				☐ Part Lost/Missing			
				☐ Misread			

DART Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7
CANADA
TEL.: 1 613 632-5200
Email: sales@dartaero.com
www.dartaerospace.com



Container No: S146954



Part: D407-667-105TRN

Job No: 188788

Serial No/Batch: S146954

Revision: D

Inspector:

Exp Date:

Instructions:

Date: 01/23/19

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DART AEROSPACE LTD	Work Order: 188788
Description: Crosstube Assembly	Part Number: D407-667-145
Inspection Dwg: D407-667-145 Rev: C	Page 1 of 2

FIRST ARTICLE INSPECTION CHECKLIST

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+0.005/-0.000	2.245	✓		CNC-04	
	1.865	+0.005/-0.000	1.870	✓		CNC-08	
	1.878	+0.005/-0.000	1.883	✓		"	
	1.970	+0.005/-0.000	1.974	✓		"	
	2.030	+0.005/-0.000	2.035	✓		CNC-04	
	2.165	+0.005/-0.000	2.169	✓		"	
	0.125	+/-0.010	.124	✓		CNC-08	
	R0.063	+/-0.010	.063	✓		RG	
	R0.500	+/-0.010	.500	✓		"	
	R0.063	+/-0.010	.063	✓		"	
	4.438	+/-0.030	4.438	✓		CNC-08	
SIDE B	2.240	+0.005/-0.000	2.245	✓		CNC-04	
	1.865	+0.005/-0.000	1.870	✓		CNC-08	
	1.878	+0.005/-0.000	1.883	✓		"	
	1.970	+0.005/-0.000	1.975	✓		"	
	2.030	+0.005/-0.000	2.034	✓		CNC-04	
	2.165	+0.005/-0.000	2.169	✓		"	
	0.125	+/-0.010	.121	✓		CNC-08	
	R0.063	+/-0.010	.063	✓		RG	
	R0.500	+/-0.010	.500	✓		"	
	R0.063	+/-0.010	.063	✓		"	
	4.438	+/-0.030	4.443	✓		CNC-08	
	113.20	+/-0.020	113.190	✓		Tape	

Entered: _____ Date: _____



WORK ORDER NON-CONFORMANCE / ROUTE UPDATE

NCR No. _____

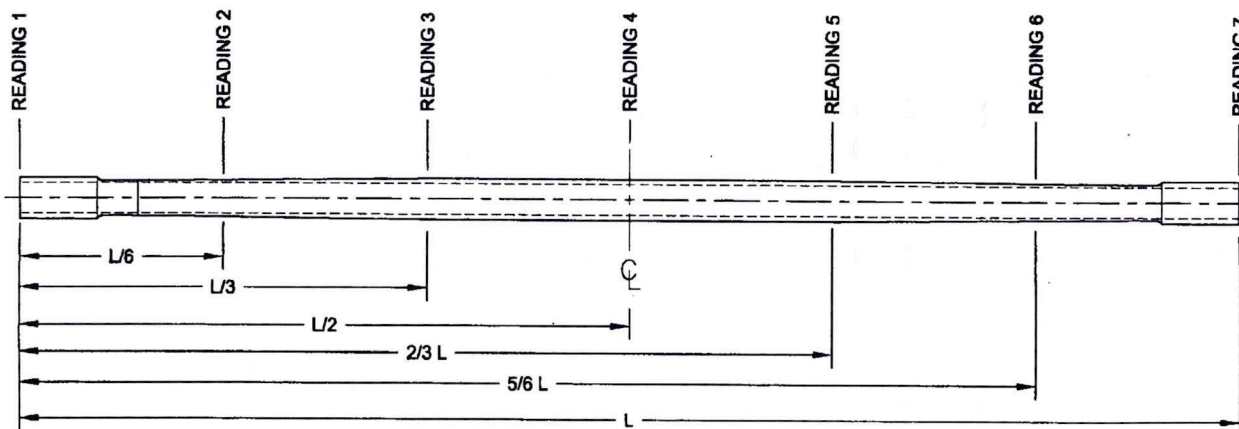
Route update only ☐

Job: _____ Part No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐	DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Eng. (Non-AW) ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Engineering ☐ Water Jet ☐ Supplier ☐ Quality ☐			
Date :	Sequence #:	QTY Affected :		MRB (QSI042)	
Description Work Order Deviation		Disposition		Completed By	
				Lead hand / Supervisor	
Root Cause Operator ☐ Manufacturing Process ☐ Equip/Tooling ☐ Handling/Presservation ☐ Material ☐ Product Improvement ☐ Process Improvement ☐ Human Factors ☐		FAULT CATEGORY ☐ Pressure/Forced ☐ Bending ☐ Crushing ☐ Cracks ☐ Crimp/Kink/Ripple/Wave/Twist ☐ Marks/Chatter ☐ Mislabeled ☐ Contamination ☐ Misaligned/off center ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Incomplete/Unclear Instructions ☐ Drill Holes ☐ Fit/Function ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain Direction ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set/Set-up ☐ Positioned Wrong ☐ Outside Tolerance ☐ Drawing ☐ Finish ☐ Part Lost/Missing ☐ Misread			
Other/Details: _____					

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DART AEROSPACE LTD	Work Order: 188788
Description: Crosstube Assembly	Part Number: D407-667-145
Inspection Dwg: D407-667-145 Rev: C	Page 2 of 2

WALL THICKNESS MEASUREMENT



Location	WALL THICKNESS MEASUREMENT (IN)				Deviation Δw (max-min)	TOLERANCE
	w1	w2	w3	w4		
READING 1 L= 0"	.329	.324	.319	.315	.014	0.042"
READING 2 L= 18.867	.175	.177	.177	.177	.002	
READING 3 L= 37.734	.270	.273	.272	.269	.004	
READING 4 L= 56.700	.320	.325	.325	.318	.007	
READING 5 L= 75.467	.269	.276	.275	.267	.009	
READING 6 L= 94.333	.179	.184	.176	.168	.016	
READING 7 L= 113.20	.332	.332	.316	.314	.018	

Calibration Result

Actual Block Thickness: 100-500

Sitescan 250 Measured Thickness: 100-500

Measured by: MD
Date: 2019-01-29

Audited by: DAS 67 9-89
Date: 19-02-05

Preliminary Approval:
Date:

Rev	Date	Change	Revised by	Approved
A	04.04.21	New Issue (P/O D407-667-105)	KJ/RF	
B	06.03.09	Dwg Rev updated	KJ/JLM	
C	09.06.11	Dwg Rev updated	KJ	
D	11.06.21	Tolerance revised for 4.438 dimension	KJ	
E	12.06.04	Wall thickness form added	KJ	

Entered: _____ Date: _____



WORK ORDER NON-CONFORMANCE / ROUTE UPDATE

NCR No. _____

Route update only ☐

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Date :		Sequence #:		QTY Affected :		MRB (QSI042)	
Description Work Order Deviation				Disposition			
DART AEROSPACE				Completed By			
				Lead hand / Supervisor			
				QC / QA Coordinator			
Root Cause Operator ☐ Manufacturing Process ☐ Equip/Tooling ☐ Handling/Preservation ☐ Material ☐ Product Improvement ☐ Process Improvement ☐ Human Factors ☐		FAULT CATEGORY ☐ Pressure/Forced ☐ Bending ☐ Crushing ☐ Cracks ☐ Crimp/Kink/Ripple/Wave/Twist ☐ Marks/Chatter ☐ Mislabeled ☐ Contamination ☐ Misaligned/off center ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Incomplete/Unclear Instructions ☐ Drill Holes ☐ Fit/Function ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain Direction ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set/Set-up ☐ Positioned Wrong ☐ Outside Tolerance ☐ Drawing ☐ Finish ☐ Part Lost/Missing ☐ Misread					
Other/Details:							

Item	Qty -145	Part Number	Description
1	X	D407-667-145	CROSSTUBE ASSEMBLY (407 HIGH FWD)
2	1	D6010-115	CROSSTUBE
3	2	D2873-043	NUT PLATE
4	2	D2873-045	NUT PLATE
5	2	D2891-1	SUPPORT
6	4	D3595-063-395	RUBBER CUSHION
7	4	MS21920-20	CLAMP (OR MS21920-21)
8	14	MS20601AD4W10	RIVET (OR NAS9302B-4-10)
9	A/R	PROSEAL 890 B-2	SEALANT, AMS-S-8802 CLASS B-2
10	2	AN742D36	CLAMP
11	2	MS9165-05	ANGLE BRACKET
12	2	MS21042L3	NUT (OR MS21042-3)
13	2	MS27039-1-08	SCREW
14	4	NAS1149C0332R	WASHER (OR AN960C10L)

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6010-115
FINISHED LENGTH = 113.20±0.020
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D407-667-145" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: 17.8 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 6 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) TO INSTALL D2891-1 SUPPORT: ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.04" TO 0.07" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- 13) INSTALL MS21920-20 CLAMPS (OR -21) WITH D3595-063-395 RUBBER CUSHIONS TO SECURE THE D2891-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMP MECHANISMS ARE LOCATED ON CROSSTUBE SUPPORTS.
- 14) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS ARE SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.
- 16) MASK AREA UNDER CLAMP PRIOR TO PAINTING.
- 17) SEAL EDGES WHERE AN742D36 CLAMP MEETS WITH THE CROSSTUBE USING SIKAFLEX-241/-291 OR MIL-S-8802 CLASS B2 OR PROSEAL 890 SEALANT.
- 18) PERFORM RESISTANCE CHECK TO ENSURE MAX RESISTANCE IS 10 MEGOHMS.

RELEASED

2018 SEP 06
2018-797

D	REVISE SHEET 2 ASSEMBLY DETAIL HOLE PATTERN PER CAR18-221. UPDATE PARTS LIST AND GENERAL NOTES 12 & 15 TO INCORPORATE DEO C-1. ADD ITEMS 10-14 TO PARTS LIST, ADD GENERAL NOTES 16-18 AND ADD SHEET 5 TO INCORPORATE DEO C-2.	JMH	18.05.01
C	REVISE GENERAL NOTES/PART LIST (ZN D7-1); REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS. D3595-063-395 WAS D2856-400-694 (ZN D6-2 & A5-2); REMOVED REF. 7 ADD TOLERANCES (ZN C6-3, C4-3, D2-3); RELOCATED FLAG #9 (ZN A8-3) PER NCR 210; MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4.	RF	08.11.06
B	ADD HOLES AND NUT PLATES FOR COMPATABILITY WITH BHT/AA SKUDTUBES	PH	05.07.26
A	NEW ISSUE	CP	02.05.08
REV.	DESCRIPTION	BY	DATE
DESIGN	JP	DART AEROSPACE LTD	
DRAWN	JMH	HAWKESBURY, ONTARIO, CANADA	
CHECKED	ZF	DRAWING NO.	REV. D
MFG. APPR.	AFB	D407-667-145	SHEET 1 OF 5
APPROVED	NO	TITLE	SCALE
DE APPR.	JP	CROSSTUBE ASS'Y (407 HIGH FWD)	NTS
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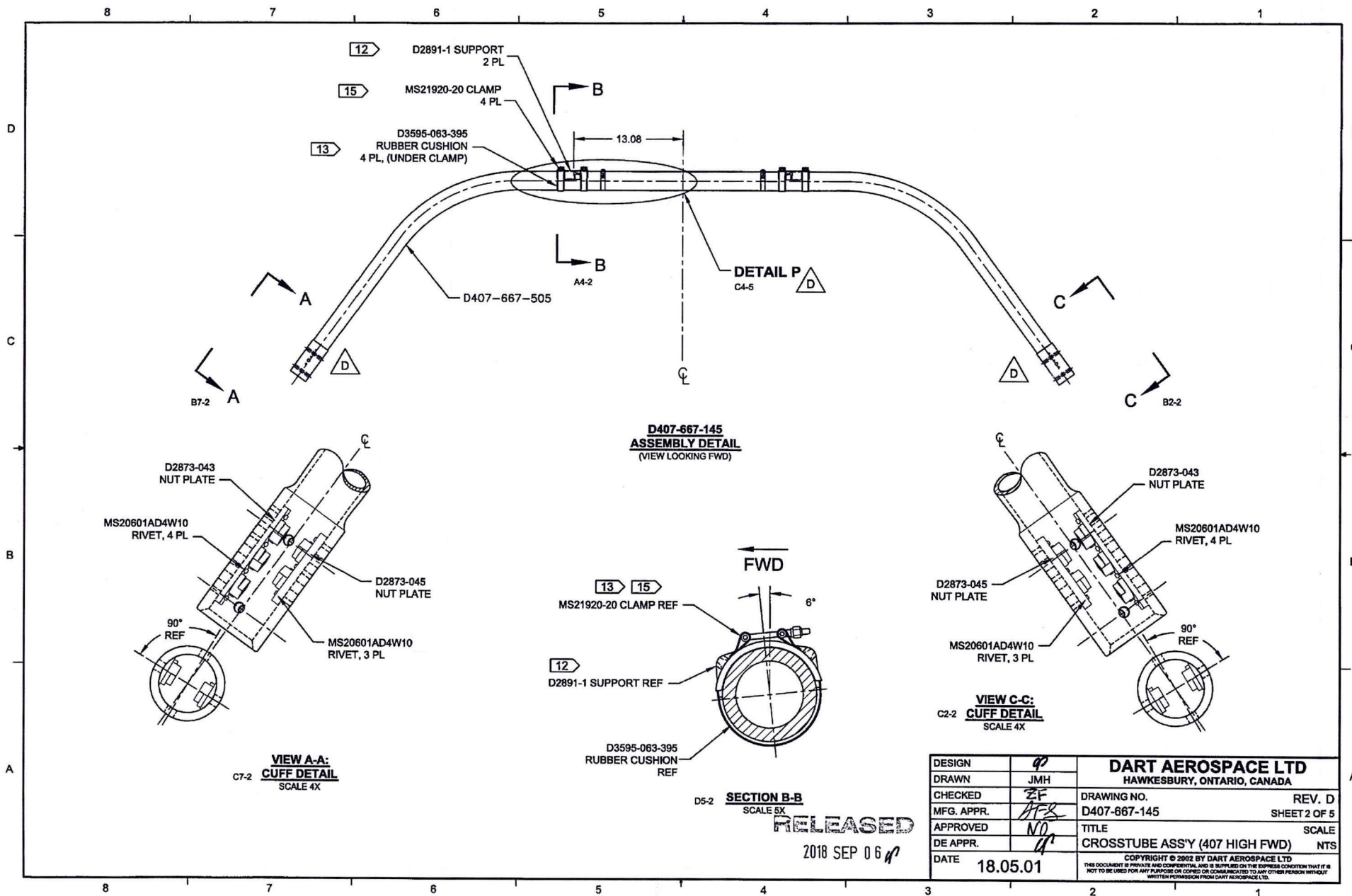


WORK ORDER NON-CONFORMANCE / ROUTE UPDATE

NCR No. _____

Route update only ☐

Job: _____ Part No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐	DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Eng. (Non-AW) ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Engineering ☐ Water Jet ☐ Supplier ☐ Quality ☐			
Date :	Sequence #:	QTY Affected :		MRB (QSI042)	
Description Work Order Deviation		Disposition		Completed By	
				Lead hand / Supervisor	
				QC / QA Coordinator	
Root Cause Operator ☐ Manufacturing Process ☐ Equip/Tooling ☐ Handling/Preservation ☐ Material ☐ Product Improvement ☐ Process Improvement ☐ Human Factors ☐ ☐ Pressure/Forced ☐ Bending ☐ Crushing ☐ Cracks ☐ Crimp/Kink/Ripple/Wave/Twist ☐ Marks/Chatter ☐ Mislabeled		FAULT CATEGORY ☐ Contamination ☐ Misaligned/off center ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Incomplete/Unclear Instructions ☐ Drill Holes ☐ Fit/Function ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain Direction ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set/Set-up ☐ Positioned Wrong ☐ Outside Tolerance ☐ Drawing ☐ Finish ☐ Part Lost/Missing ☐ Misread			
Other/Details:					



DESIGN	90	DART AEROSPACE LTD	
DRAWN	JMH	HAWKESBURY, ONTARIO, CANADA	
CHECKED	EF	DRAWING NO.	REV. D
MFG. APPR.	AFB	D407-667-145	SHEET 2 OF 5
APPROVED	ND	TITLE	SCALE
DE APPR.	90	CROSSTUBE ASS'Y (407 HIGH FWD)	NTS
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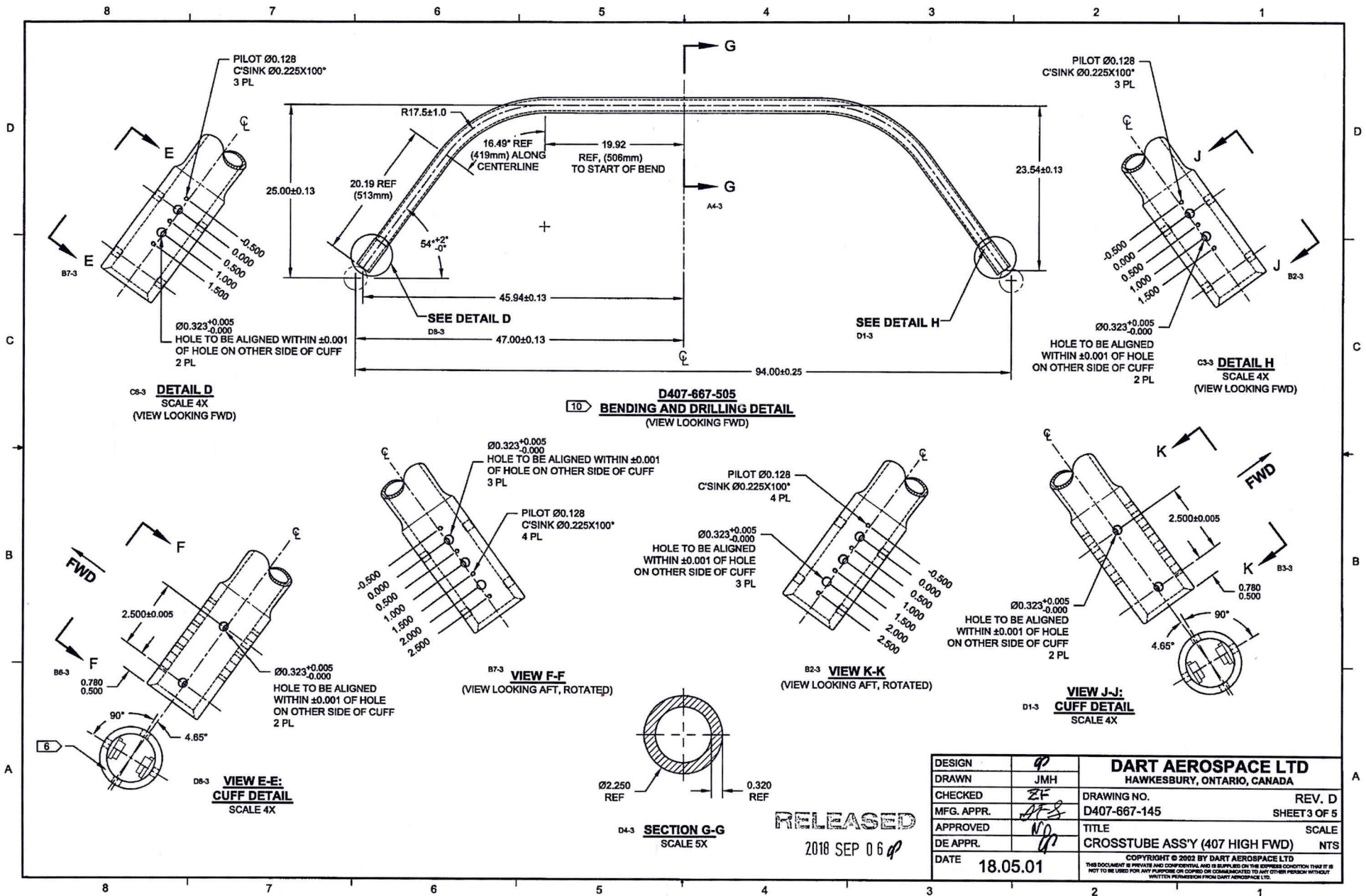


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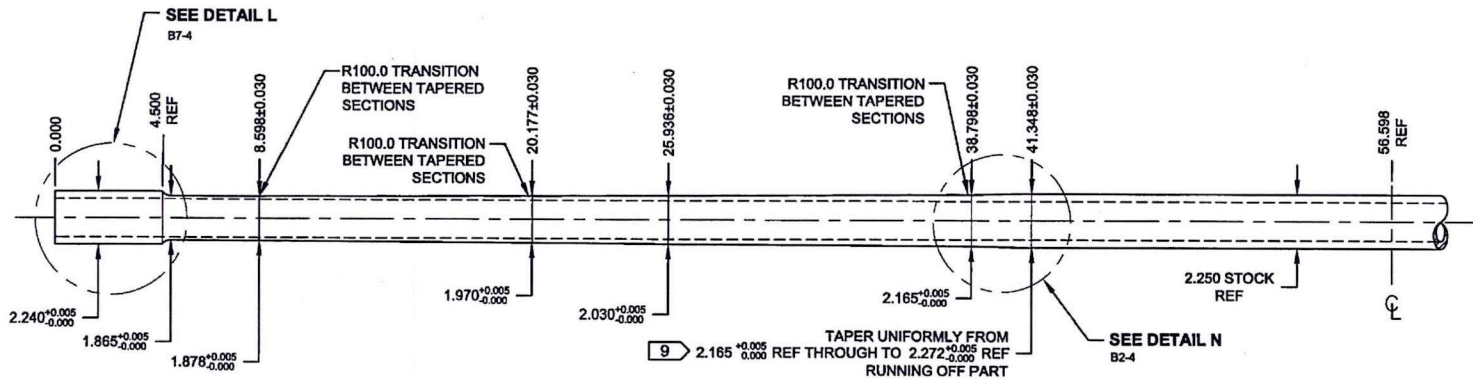


WORK ORDER NON-CONFORMANCE / ROUTE UPDATE

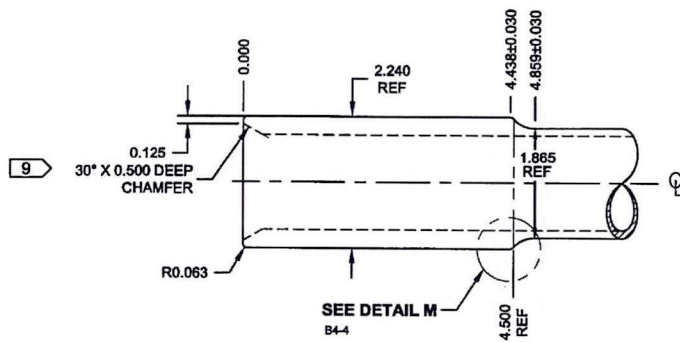
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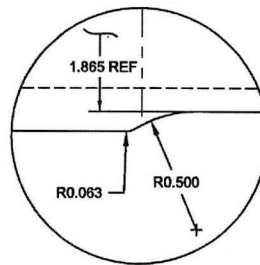
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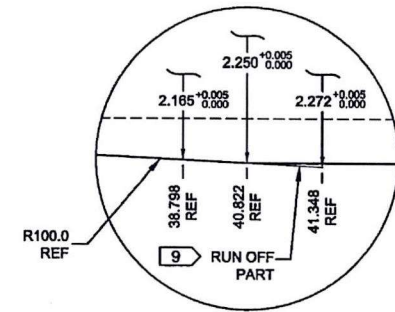
TURNING DETAIL



DETAIL L:
D7-4 **CROSSTUBE CUFF**
NOT TO SCALE



DETAIL M:
B8-4 **CUFF TRANSITION**
NOT TO SCALE



DETAIL N:
C3-4 **TAPER RUN-OFF**
NOT TO SCALE

RELEASED

2018 SEP 06

DESIGN	9	DART AEROSPACE LTD	
DRAWN	JMH	HAWKESBURY, ONTARIO, CANADA	
CHECKED	ZF	DRAWING NO.	REV. D
MFG. APPR.	AFS	D407-667-145	SHEET 4 OF 5
APPROVED	NO	TITLE	SCALE
DE APPR.	9	CROSSTUBE ASS'Y (407 HIGH FWD)	NTS
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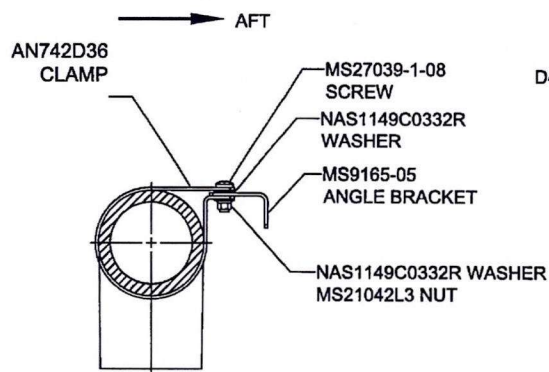


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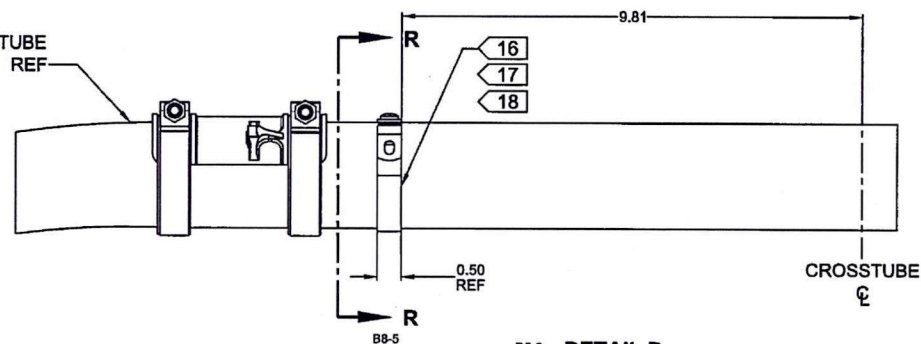
NCR No. _____

Route update only ☐

Job: _____ Part No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐	DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Eng. (Non-AW) ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Engineering ☐ Water Jet ☐ Supplier ☐ Quality ☐			
Date :	Sequence #:	QTY Affected :		MRB (QSI042)	
Description Work Order Deviation			Disposition		
			Completed By		
			Lead hand / Supervisor		
			QC / QA Coordinator		
Root Cause Operator ☐ Manufacturing Process ☐ Equip/Tooling ☐ Handling/Presservation ☐ Material ☐ Product Improvement ☐ Process Improvement ☐ Human Factors ☐		FAULT CATEGORY ☐ Pressure/Forced ☐ Bending ☐ Crushing ☐ Cracks ☐ Crimp/Kink/Ripple/Wave/Twist ☐ Marks/Chatter ☐ Mislabeled ☐ Contamination ☐ Misaligned/off center ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Incomplete/Unclear Instructions ☐ Drill Holes ☐ Fit/Function ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain Direction ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set/Set-up ☐ Positioned Wrong ☐ Outside Tolerance ☐ Drawing ☐ Finish ☐ Part Lost/Missing ☐ Misread			
Other/Details:					



D407-667-505 CROSSTUBE
REF



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2018 SEP 06

DESIGN	9P	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWN	JMH		
CHECKED	ZF	DRAWING NO.	REV. D
MFG. APPR.	AFK	D407-667-145	SHEET 5 OF 5
APPROVED	WJ	TITLE	SCALE
DE APPR.	9P	CROSSTUBE ASSY (407 HIGH FWD)	NTS
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WORK ORDER NON-CONFORMANCE / ROUTE UPDATE

NCR No. _____

Route update only ☐

Job: _____ Part No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐	DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Eng. (Non-AW) ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Engineering ☐ Water Jet ☐ Supplier ☐ Quality ☐			
Date : _____	Sequence #: _____	QTY Affected : _____		MRB (QSI042)	
Description Work Order Deviation		Disposition		Completed By	
Root Cause Operator ☐ Manufacturing Process ☐ Equip/Tooling ☐ Handling/Presservation ☐ Material ☐ Product Improvement ☐ Process Improvement ☐ Human Factors ☐ ☐ Pressure/Forced ☐ Bending ☐ Crushing ☐ Cracks ☐ Crimp/Kink/Ripple/Wave/Twist ☐ Marks/Chatter ☐ Mislabeled		FAULT CATEGORY ☐ Contamination ☐ Misaligned/off center ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Incomplete/Unclear Instructions ☐ Drill Holes ☐ Fit/Function ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain Direction ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set/Set-up ☐ Positioned Wrong ☐ Outside Tolerance ☐ Drawing ☐ Finish ☐ Part Lost/Missing ☐ Misread			
Other/Details:					